

TRANSPORTATION FUELS TAX ANALYSIS

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INTRODUCTION

This staff working paper examines the effect of varying transportation fuel tax assumptions on the forecasted base case prices of reformulated gasoline, reformulated diesel, fleet propane, compressed natural gas (CNG) and M85 (a mixture of 85 percent methanol and 15 percent gasoline). Liquefied natural gas (LNG) has been included in some of the tax comparison figures, due to the controversy that was generated by the recent ruling that this fuel be taxed at a federal rate similar to propane, not CNG. Jet fuel kerosene and railroad diesel were not examined because these fuels are not used by vehicles for operation on the highways of California.

Three different tax cases were run to analyze their effect upon the forecasted transportation fuel prices. One sensitivity (Tax Case 1) examined the effect of increasing the current fuel excise taxes (federal and state) at the same rate as inflation, throughout the forecast period. Another case (Tax Case 2) set all the fuel excise taxes equal to the gasoline excise taxes on an energy equivalent basis, and deflated these amounts throughout the forecast period using the Energy Commission's implicit GNP price deflator series, which was revised on October 28, 1994. The final case (Tax Case 3) set all the fuel excise taxes equal to the gasoline excise taxes on an energy equivalent basis, then increased the excise taxes to match inflation throughout the forecast period.

Allowing both federal and state excise taxes to increase with the rate of inflation results in a significant increase in the forecasted price of all the fuels. Setting both excise taxes equal to gasoline on an energy equivalent basis, then deflating throughout the forecast period (Tax Case 2), results in a lower price for diesel fuel, a slight increase for M85, a moderate price increase for propane and a significant price increase for CNG. Setting both excise taxes equal to gasoline on an energy equivalent basis, then increasing throughout the forecast period to match the rate of inflation (Tax Case 3), results in a significant price increase for all the transportation fuels examined.

TYPES OF TRANSPORTATION FUEL TAXES

California transportation fuel taxes consist of three distinct types: federal excise, state excise, and sales tax. The magnitudes of the excise taxes and applicability of the sales tax varies by fuel type, as well as the methodology for the calculation of the sales tax.

Federal transportation fuel excise taxes are added to the pre-retail price of the fuel at varying amounts, depending on fuel type and application. Refer to **Table 1** for the current federal and state excise tax rates for specific transportation fuels. The majority of revenue generated from the collection of federal transportation excise taxes is deposited in the Highway Trust Fund (84 percent in 1992 FY), with a lesser portion (16 percent) deposited in the General Fund. Monies from the Highway Trust Fund are to be used to improve and maintain the federal transportation infrastructure, mainly the federal highway system.

Table 1

Federal and State Fuel Excise Tax Rates			
Fuel Type and Application	1995 Federal Fuel Excise Tax (Cents/Gallon)	1995 California State Fuel Excise Tax (Cents/Gallon)	1995 Total Combined Fuel Excise Taxes (Cents/Gallon)
** Aviation Fuels - Commercial	0.10	0.00	0.10
Aviation Gasoline - Noncommercial	19.40	18.00	37.40
Aviation Jet Fuel - Noncommercial	21.90	2.00	23.90
*CNG - Highway Vehicles	48.54	70.00	118.54
*CNG - Motorboats	48.54	70.00	118.54
Diesel Fuel - Commercial Motorboats	0.00	0.00	0.00
Diesel Fuel - Farm Use	0.00	0.00	0.00
Diesel Fuel - Highway Vehicles	24.40	18.00	42.40
Diesel Fuel - Intercity Buses	7.40	18.00	25.40
Diesel Fuel - Noncommercial Motorboats	24.40	0.00	24.40
Diesel Fuel - Railroads	6.90	0.00	6.90
Fuels - Export	0.00	0.00	0.00
Fuels - Inland Waterways	23.40	0.00	23.40
Fuels - International Aviation	0.00	0.00	0.00
Fuels - International Shipping	0.00	0.00	0.00
Fuels - Military Ships and Aircraft	0.00	0.00	0.00
Fuels - Nonprofit Educational	0.00	0.00	0.00
Fuels - Off-Highway Business	0.00	0.00	0.00
Fuels - State and Local Governments	0.00	0.00	0.00
Gasohol (E10) - Highway Vehicles	13.00	18.00	31.00
Gasohol (M10) - Highway Vehicles	12.40	18.00	30.40
Gasoline - Commercial Motorboats	0.00	0.00	0.00
Gasoline - Farm Use	0.00	0.00	0.00
Gasoline - Highway Vehicles	18.40	18.00	36.40
Gasoline - Non-Business	0.00	0.00	0.00
Gasoline - Noncommercial Motorboats	18.40	18.00	36.40
M-85 - Highway Vehicles	11.40	9.00	20.40
Special Fuels - Highway Vehicles	18.40	9.00	27.40
Special Fuels - LPG and LNG	18.30	6.00	24.30
Special Fuels - Motorboats	18.40	9.00	27.40

* These Units Are Expressed In Terms Of Cents Per Thousand Cubic Feet (MCF) Of Natural Gas

** Commercial Aviation Fuels Federal Excise Tax Increases To 4.4 Cents On January 1, 1996.

Source: California Energy Commission - Fuel Resources Office

The State of California also levies a state excise tax on transportation fuels, similar to the federal version by the fact that it varies by fuel type and application. Revenue generated by these tax receipts is deposited in the California Highway Users Tax Fund. Monies from this account are distributed to state, county, and local agencies for improvements and maintenance of public roads and mass transit systems.

The final type of tax levied on all transportation fuels, except CNG, is the California sales tax. The sales tax is a specific percentage applied to some pre-retail price of a commodity. The actual rate varies from county to county due to additional special district tax increases approved by voters. Sales tax revenue is deposited in the California General Fund. The gasoline sales tax is calculated after the federal and state excise taxes have been added to the pre-tax fuel price. All of the other fuels in this study have the sales tax rate applied after including the federal excise tax, but before the state excise tax is included.

RECENT TRANSPORTATION FUEL TAX HISTORY

Transportation fuel excise taxes and the California sales tax rate have increased in recent years, sometimes at a rate greater than inflation. **Figure 1** illustrates the changes for the various transportation fuel federal excise tax rates in 1993 constant dollars, so that the effect of inflation has been removed. The starting period of 1985 was selected because it coincides with the beginning of the time period examined during the regression analysis that was conducted in conjunction with development of the Base Case transportation fuel price forecasts. The price tracks show that the federal excise tax rates for the five fuels have been increasing at a rate greater than inflation, during the period 1985 through 1995. This case is not entirely the same for California fuel excise taxes.

Figure 2 illustrates the changes for the state excise tax rates over the 1985 through 1995 time period, once again adjusted for inflation. The graph illustrates the fact that propane and CNG excise tax values have been declining faster than inflation, while gasoline, diesel and M85 values have been increasing at a rate greater than inflation.

CURRENT TRANSPORTATION FUEL TAX COMPARISON

Figure 3 compares six transportation fuel excise tax values side-by-side. All of the federal excise tax values are greater than the California excise values, except for CNG. Since each fuel contains a different amount of energy, comparing different excise tax values on a per-gallon basis can be misleading. For purposes of this excise tax analysis, the current excise tax values were compared on an energy equivalent basis. This step was accomplished by determining the number of cents per 100,000 Btus embodied in the various fuel-specific excise tax rates. Gasoline's current average energy content of 115,400 Btus per gallon means that the federal excise tax of 18.4 cents per gallon converts to approximately 15.9 cents per 100,000 Btus. **Figure 4** illustrates the results of this type of comparison.

FIGURE 1
FEDERAL FUEL EXCISE TAX COMPARISON
1985 Through 1995

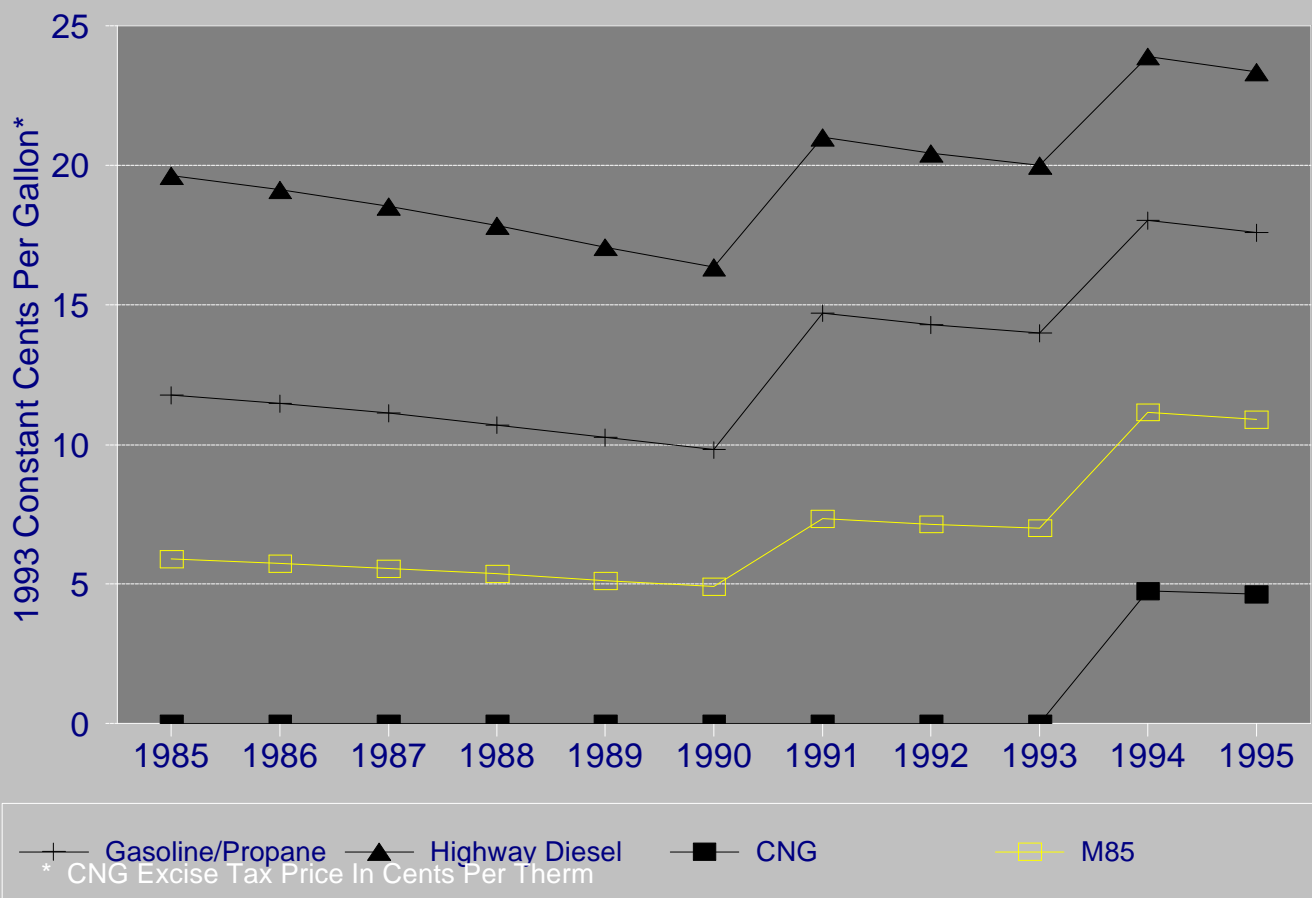


FIGURE 2

CALIFORNIA FUEL EXCISE TAX COMPARISON 1985 Through 1995

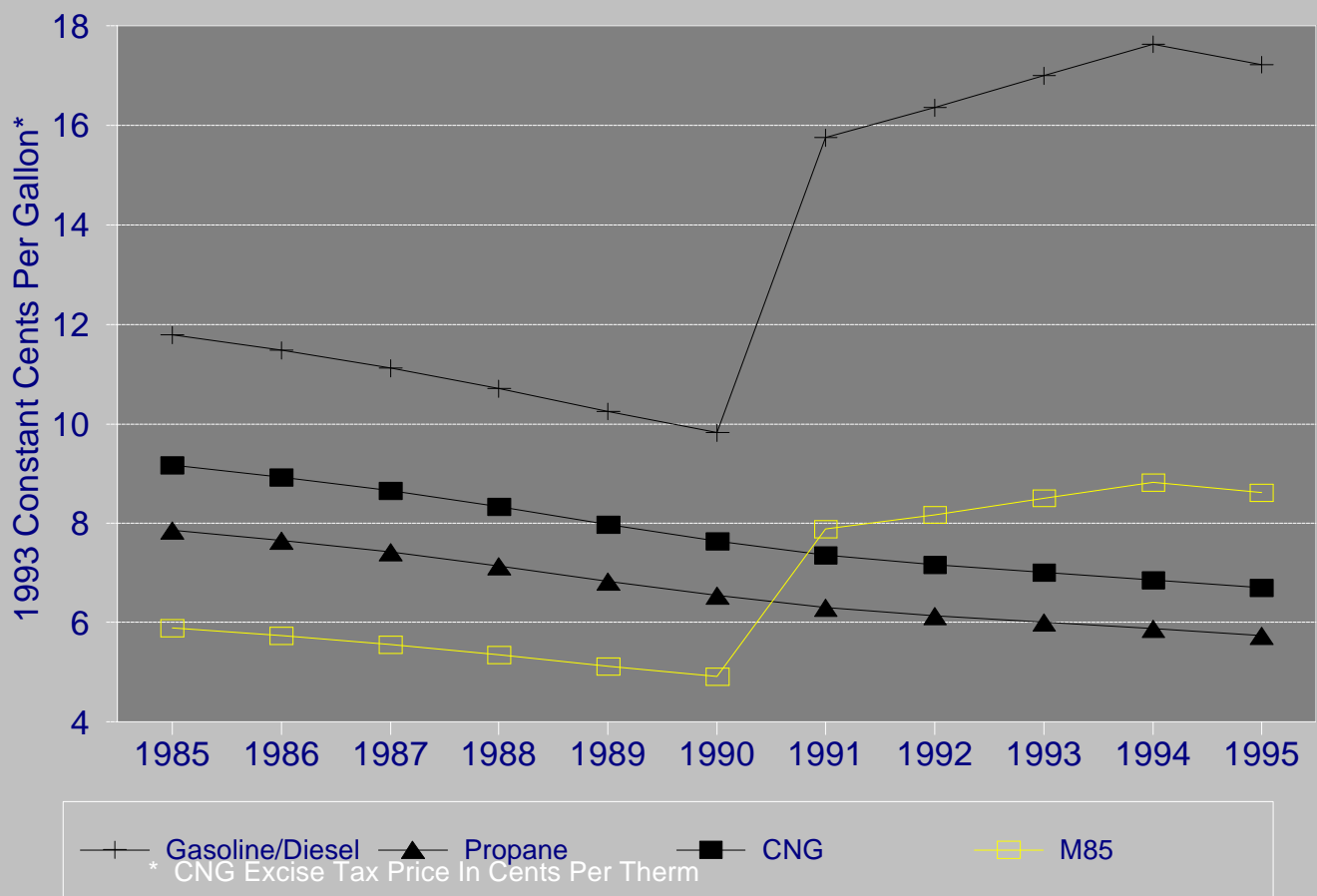
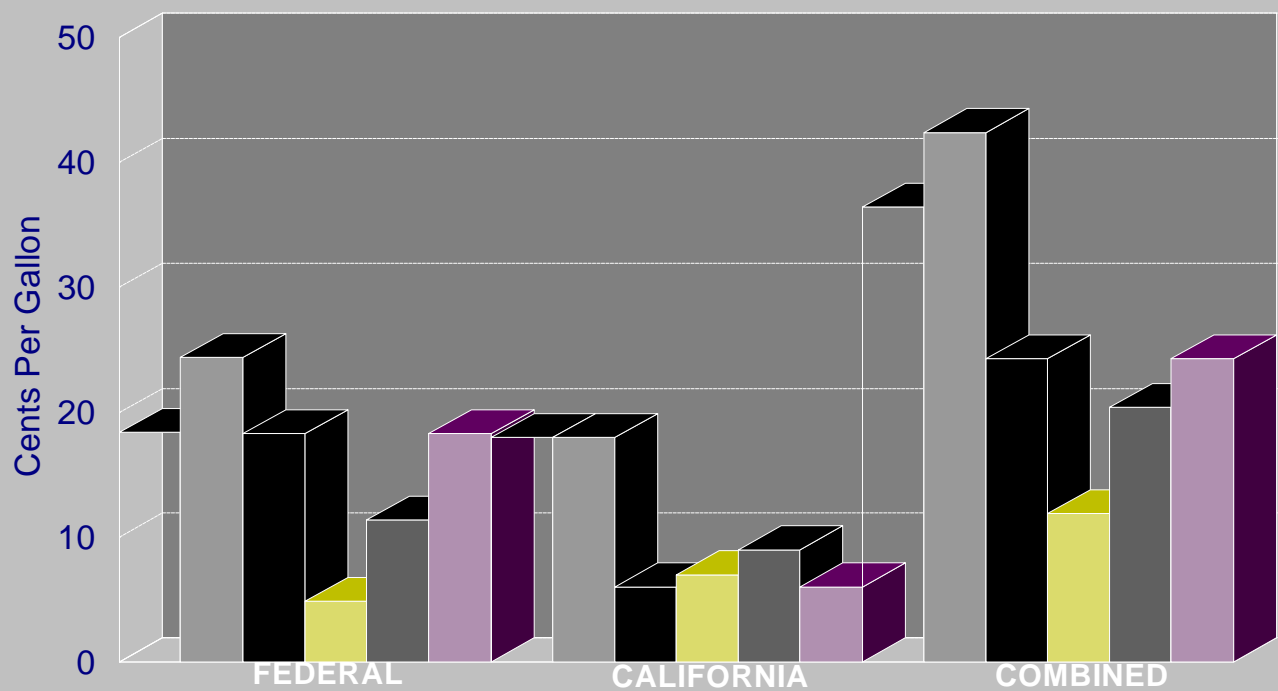


FIGURE 3
1995 FUEL EXCISE TAX COMPARISON
 Current Values



* CNG excise tax value in cents per therm.

FIGURE 4

1995 FUEL EXCISE TAX COMPARISON

Current Values, Energy Equivalent Basis

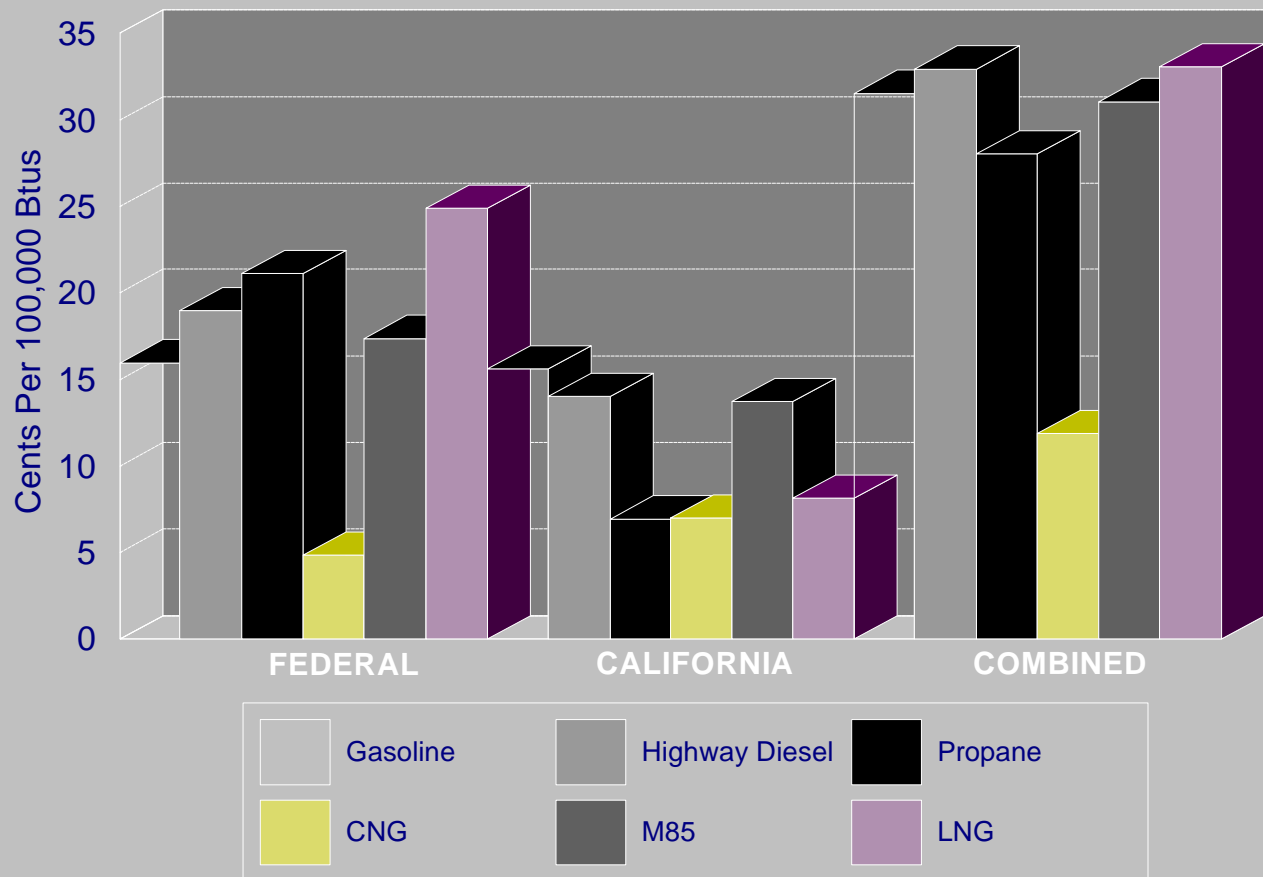


Figure 5 shows the direction and magnitude that the federal and state excise tax rates (per 100,000 Btus) would need to be adjusted to be the same as gasoline, on an energy equivalent basis. All the vertical bars above zero indicate a transportation fuel that is undertaxed, compared to gasoline. Conversely, all vertical bars below zero indicate a fuel overtaxed, compared to gasoline. With regard to the federal excise tax values, only CNG required an upward adjustment, pointing out the fact that this fuel's federal excise tax value is undertaxed compared to gasoline. Diesel, propane, M85, and LNG required a decrease, an indication that these fuels are overtaxed compared to gasoline. The comparison of the California excise tax rates reveals a different story. All of the fuels' California excise tax values required an upward adjustment, an indication that these fuels are undertaxed compared to gasoline.

Figure 6 shows the amount the excise taxes would need to be adjusted from their current values, on a per gallon basis, to equilibrate their tax burden to that of gasoline on an energy equivalent basis. **Figure 7** shows the revised side-by-side comparison of the six transportation fuels excise taxes, on a per gallon basis (except CNG being expressed in cents per therm). These revised excise tax values were used as part of the analysis performed for Tax Case scenarios 2 and 3.

ADJUSTED TAX VALUE EFFECT ON TRANSPORTATION FUEL PRICE FORECAST

The main purpose of performing the three Tax Case sensitivities is to ascertain the effects of altering specific assumptions contained in the Base Case fuel price forecasts. Tax Case 1 examines the effect of increasing excise taxes at the same rate as inflation. The results indicate that price deviations from the Base Case forecast are significant. Tax Case sensitivities 2 and 3 examine the effect of setting the non-gasoline excise tax rates equal to gasoline on an energy equivalent basis. As with Tax Case 1, the new excise tax values are increased at the same rate as inflation for Tax Case 3, whereas the new excise tax values for Tax Case 2 are deflated over time. The results of Tax Case 2 analysis indicate that the price deviations are the least significant, compared to the Base Case price forecasts. The only exception is CNG, with deviations greater than those indicated in Tax Case 1. The results of Tax Case 3 revealed the most significant deviations from Base Case price forecasts for all the fuels, except diesel.

The Base Case fuel price forecast methodologies and assumptions are discussed in greater detail in the Energy Commission working paper, **Transportation Fuels Price Analysis**, publication number P300-95-017F. The following paragraphs provide additional fuel-specific details of the Tax Case scenario results.

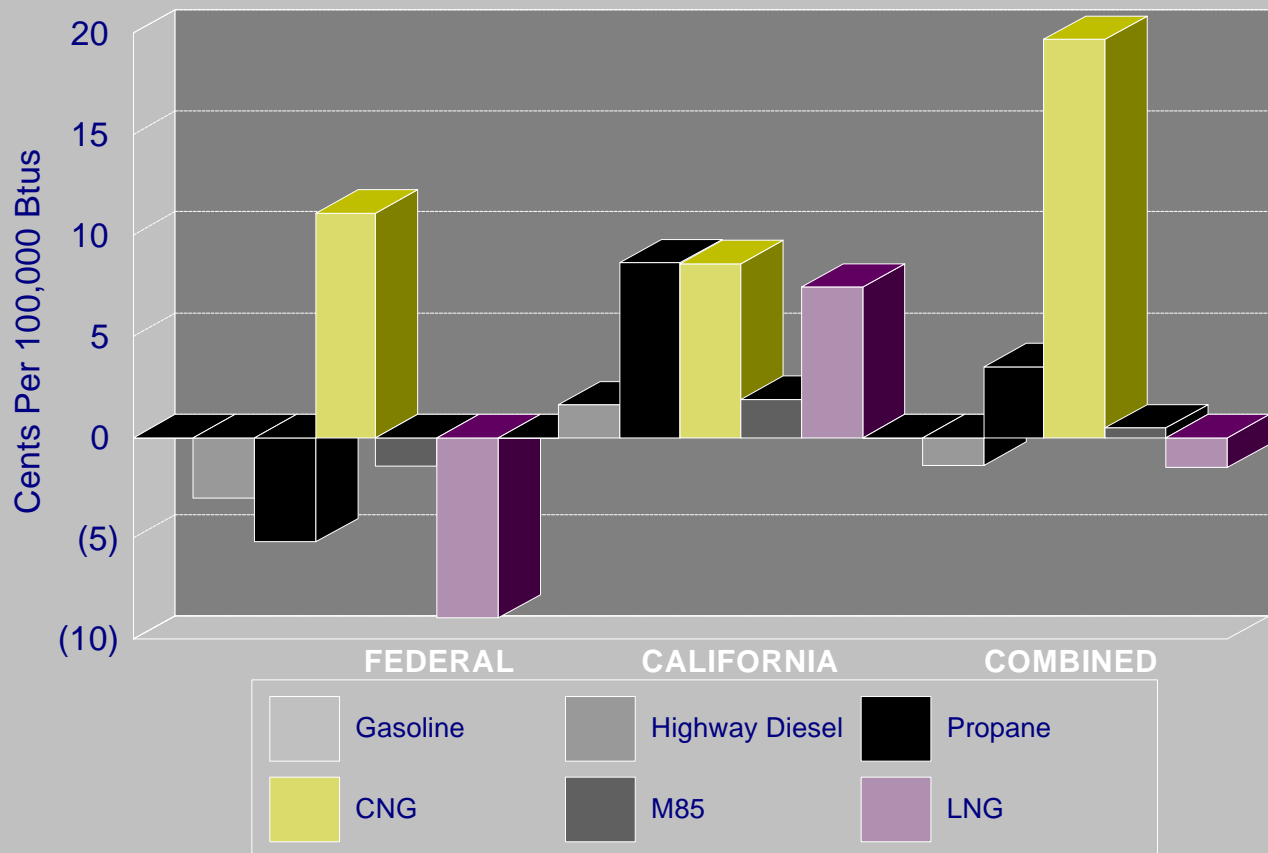
Reformulated Gasoline

Figure 8 graphs the results of Tax Case 1, showing an increase in the 2015 price of approximately 20 cents per gallon. Tax Case 2 results are not graphed because they are identical to the Base Case price series. Similarly, Tax Case 3 results are not graphed because they are identical to the Tax Case 1 price series.

FIGURE 5

1995 FUEL EXCISE TAX COMPARISON

Gasoline Gal. Excise Tax Equiv. Change*

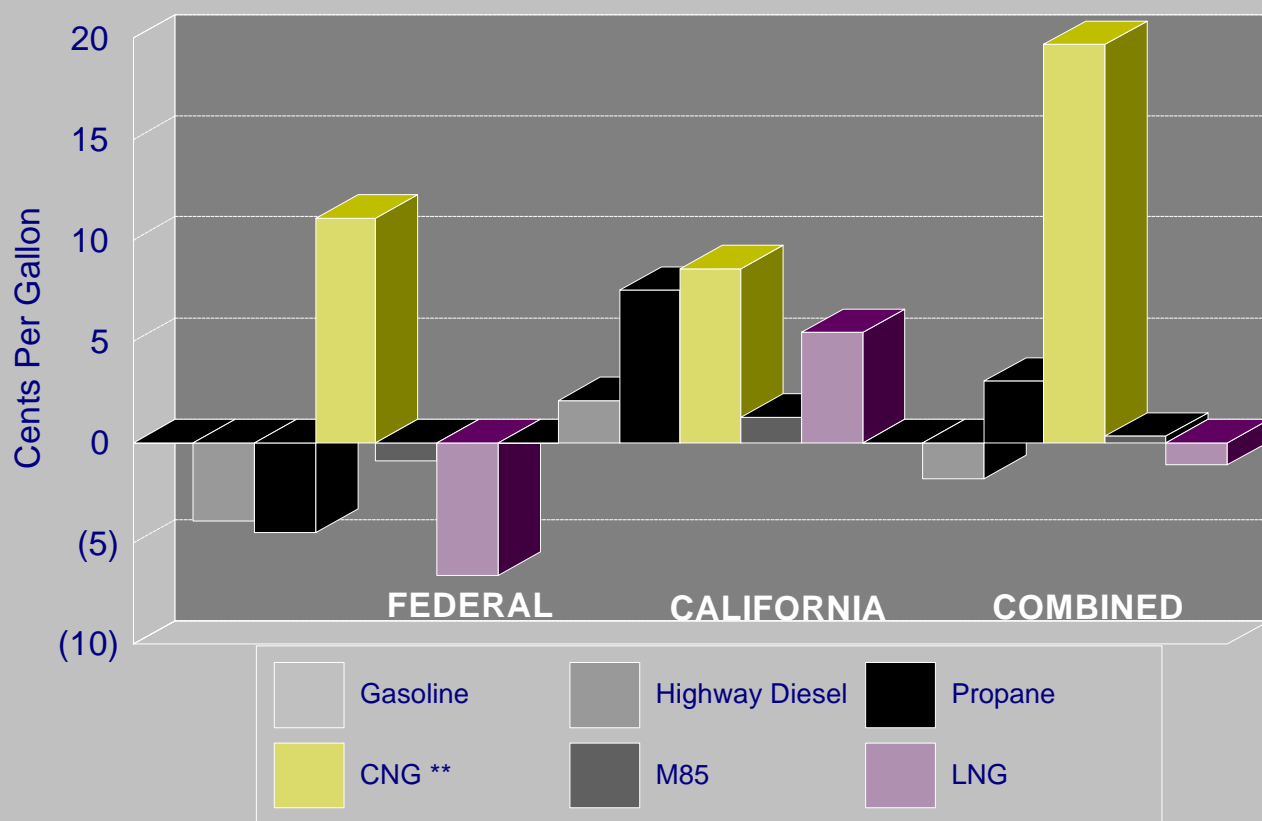


* Adjusts non-gasoline fuel excise taxes to be equal to gasoline's tax value at its energy content.

FIGURE 6

1995 FUEL EXCISE TAX COMPARISON

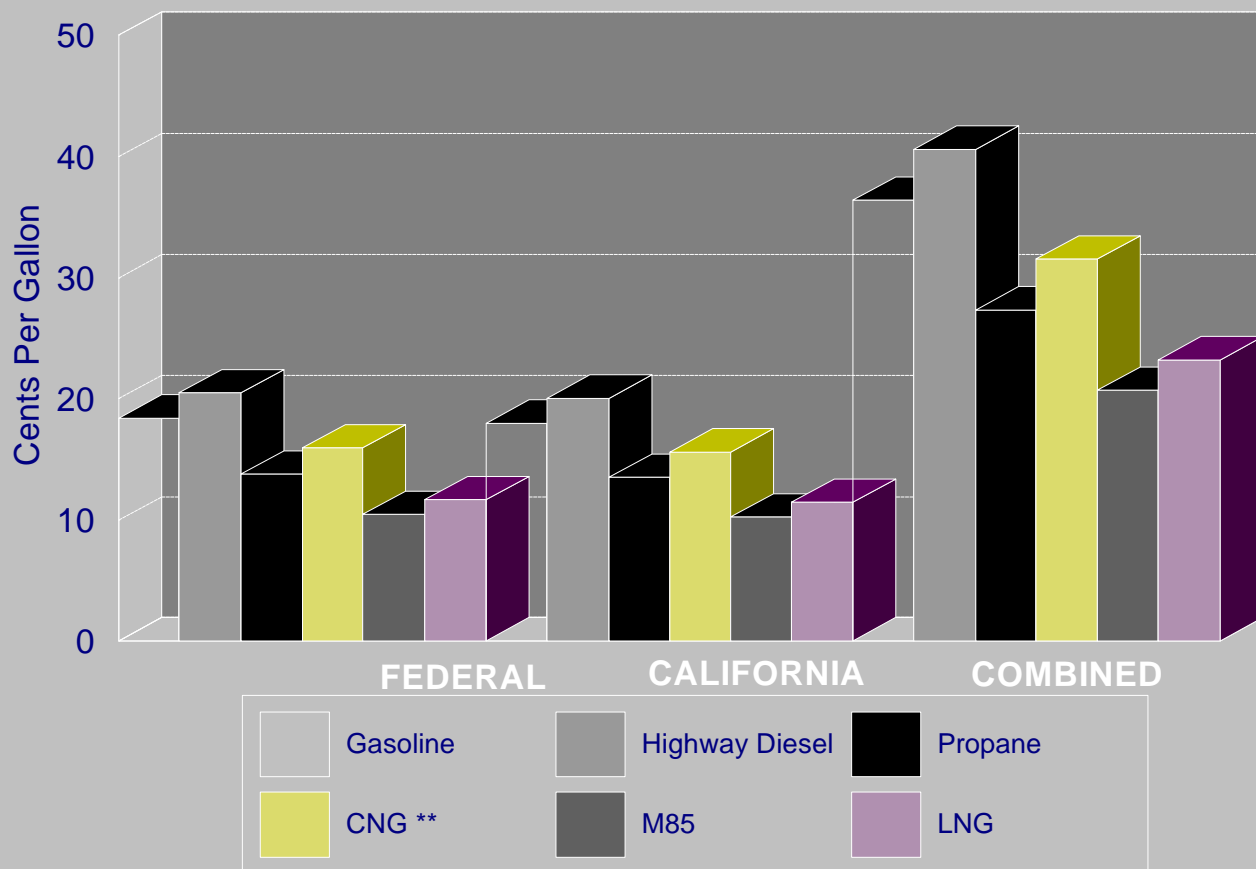
Gasoline Gal. Excise Tax Equiv. Change*



* Adjusts non-gasoline fuel excise taxes to be equal to gasoline's tax value at its energy content.

** CNG excise tax value in cents per therm.

FIGURE 7
1995 FUEL EXCISE TAX COMPARISON
 Gasoline Gallon Excise Tax Equivalent*



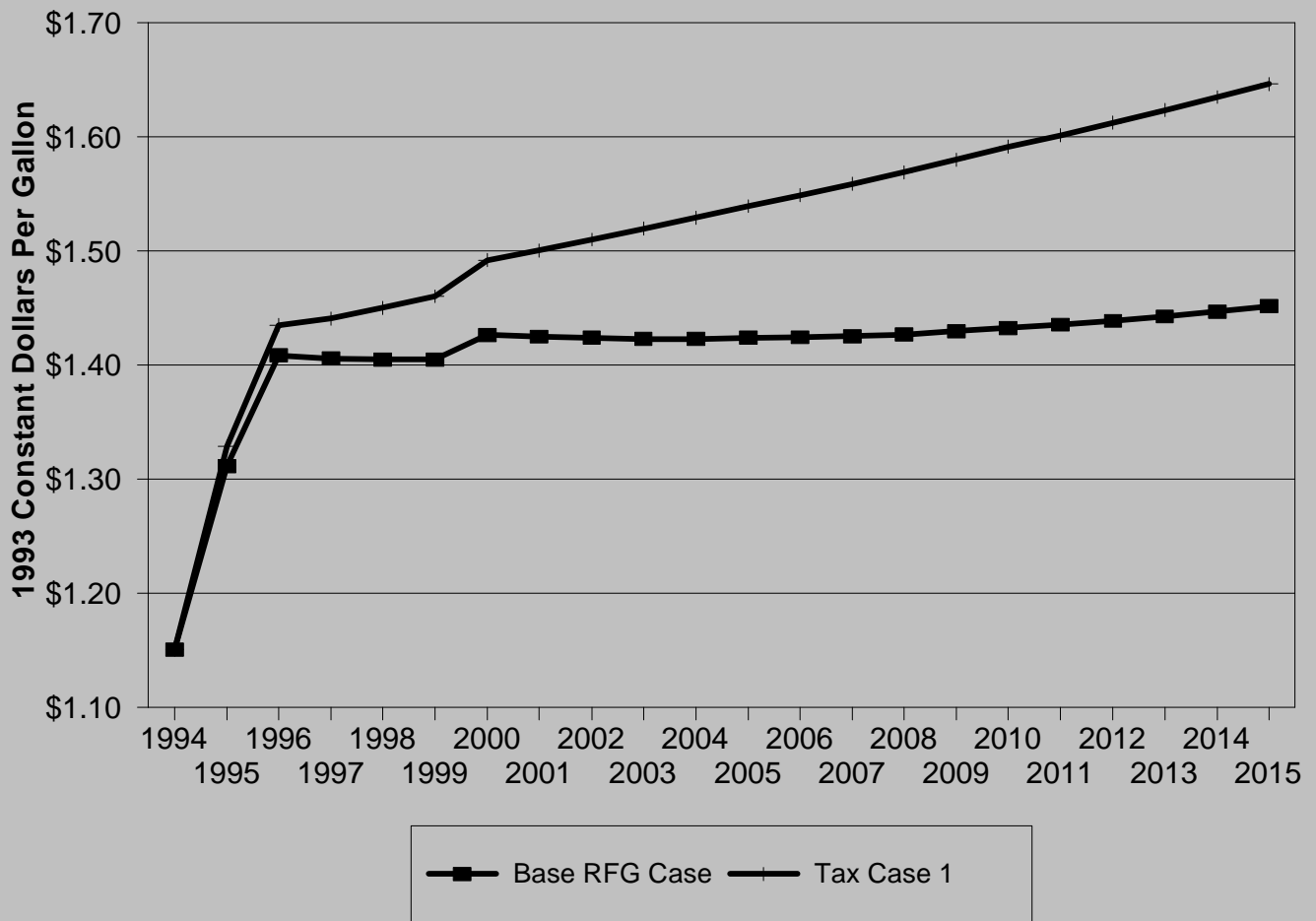
* Adjusts non-gasoline fuel excise taxes to be equal to gasoline's tax value at its energy content.

** CNG excise tax value in cents per therm.

FIGURE 8

CALIFORNIA RETAIL REFORMULATED GASOLINE

Base RFG Case vs. Tax Case 1 Prices



Reformulated Diesel

Figure 9 compares all three Tax Cases to the Base Case. Tax Case 1 and 3 results show a significant increase in the forecasted price, approximately 22 cents per gallon, by the year 2015. Tax Case 2 results show a slight decrease in the forecasted diesel price, due to the fact that diesel fuel is slightly overtaxed when compared to gasoline on a tax burden per energy equivalent basis.

Fleet Propane

Figure 10 compares all three Tax Cases to the Base Case. Tax Case 1 and 3 results show a significant increase in the forecasted price, approximately 12 to 17 cents per gallon, by the year 2015. Tax Case 2 results show a slight increase over the forecast period due to the fact that propane is slightly undertaxed compared to gasoline on a tax burden per energy equivalent basis.

Compressed Natural Gas

Figure 11 compares all three Tax Cases to the Base Case. All Tax Cases results show a significant increase in the forecasted price, approximately 15 to 35 cents per therm, by the year 2015. Two factors are the chief cause, sales tax omission and undertaxation. CNG currently does not have California sales tax applied to the final price. For purposes of all the CNG Tax Case scenario runs, sales tax is included in the new calculations. A second factor is that CNG is greatly undertaxed compared to gasoline on a tax burden per energy equivalent basis.

M85

Unlike the other transportation fuels in this tax case analysis, M85 actually has two distinct Base Cases with varying assumptions. The first Base Case assumes that the methanol required for blending with gasoline is acquired from supply sources located inside the United States. This Base Case is referred to as **Domestic Methanol**. The second Base Case assumes that the methanol supply sources are located outside the United States, mainly Venezuela. This Base Case is referred to as **Remote Methanol**. The main difference between the two Base Cases is that the Domestic Methanol is much more expensive than the Remote Methanol.

Figure 12 compares all three Tax Cases to the Domestic Methanol Base Case. Tax Case 1 and 3 results show a modest increase in the forecasted price, approximately 10 cents per gallon, by the year 2015. Tax Case 2 results show a slight increase over the forecast period due to the fact that M85 is slightly undertaxed compared to gasoline on a tax burden per energy equivalent basis.

Figure 13 compares all three Tax Cases to the Remote Methanol Base Case. The relative deviations of the various Tax Case price tracks, compared to the Base Case price track, are similar to the differences shown in figure 12.

FIGURE 9

CALIFORNIA RETAIL REFORMULATED DIESEL

Base Case vs. All Tax Case Prices

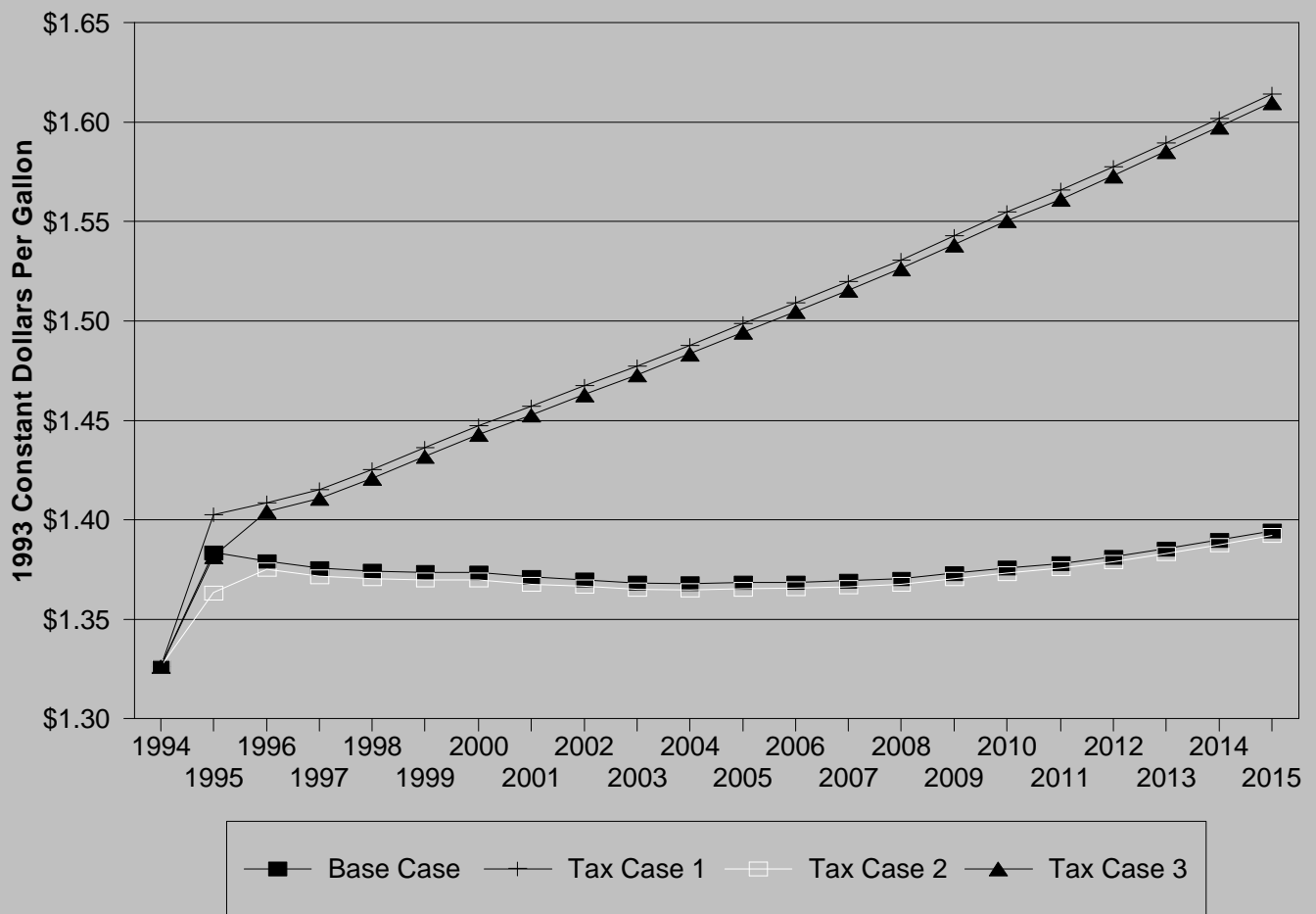


FIGURE 10
CALIFORNIA RETAIL FLEET PROPANE
Base Case vs. All Tax Case Prices

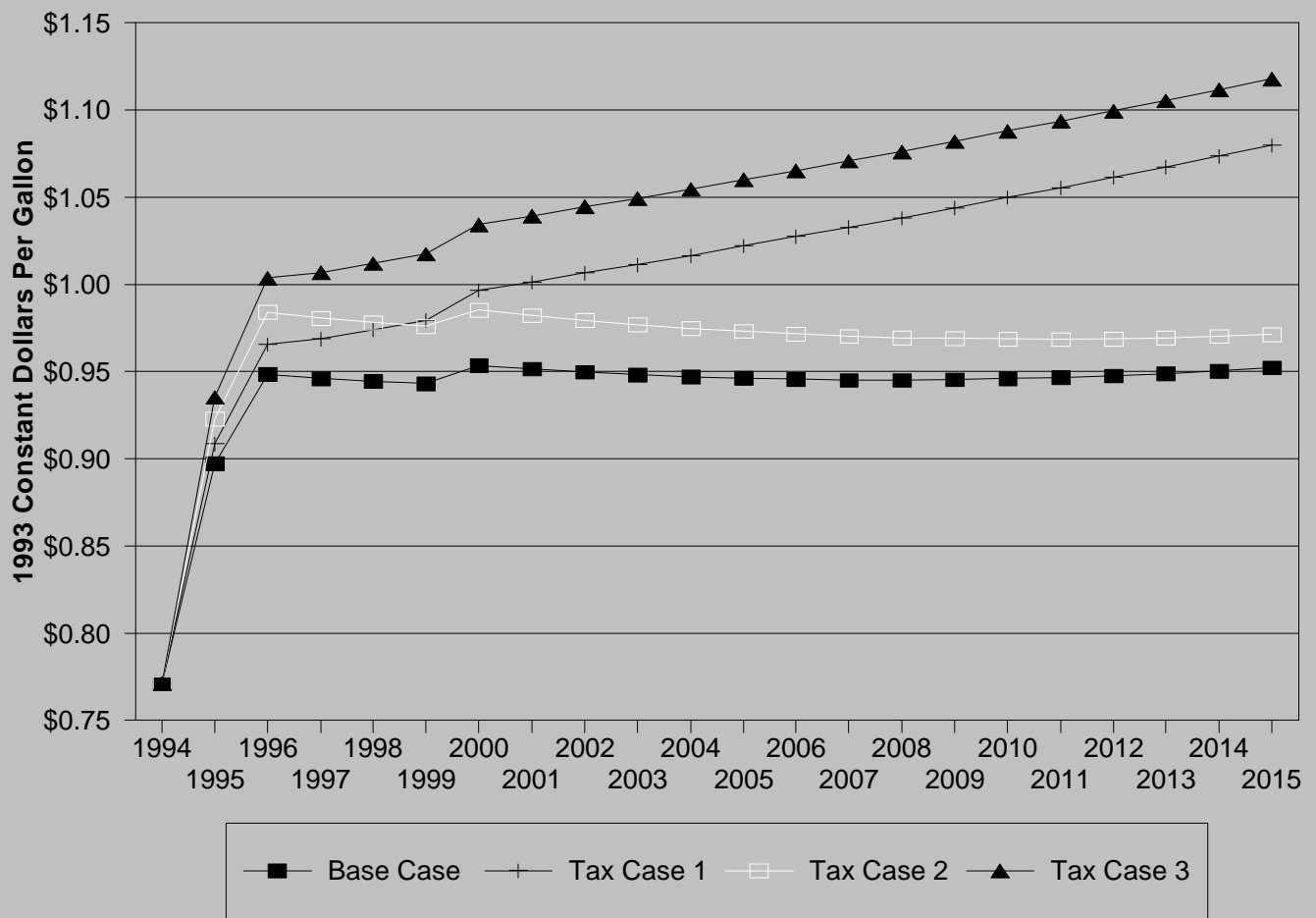


FIGURE 11

CALIFORNIA RETAIL CNG

Base Case vs. All Tax Case Prices

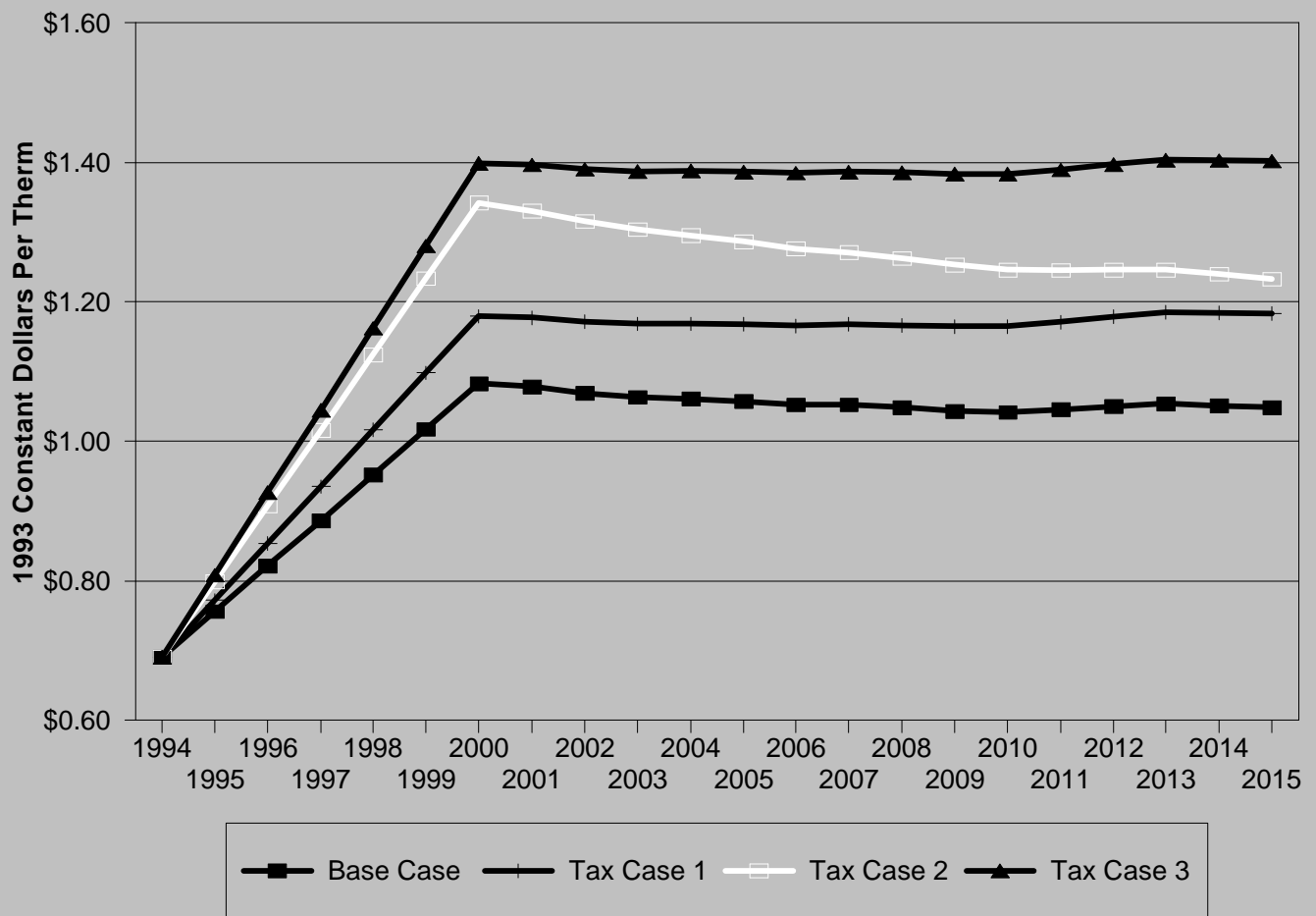


FIGURE 12

CALIFORNIA RETAIL M85, DOMESTIC METHANOL

Base Case vs. All Tax Case Prices

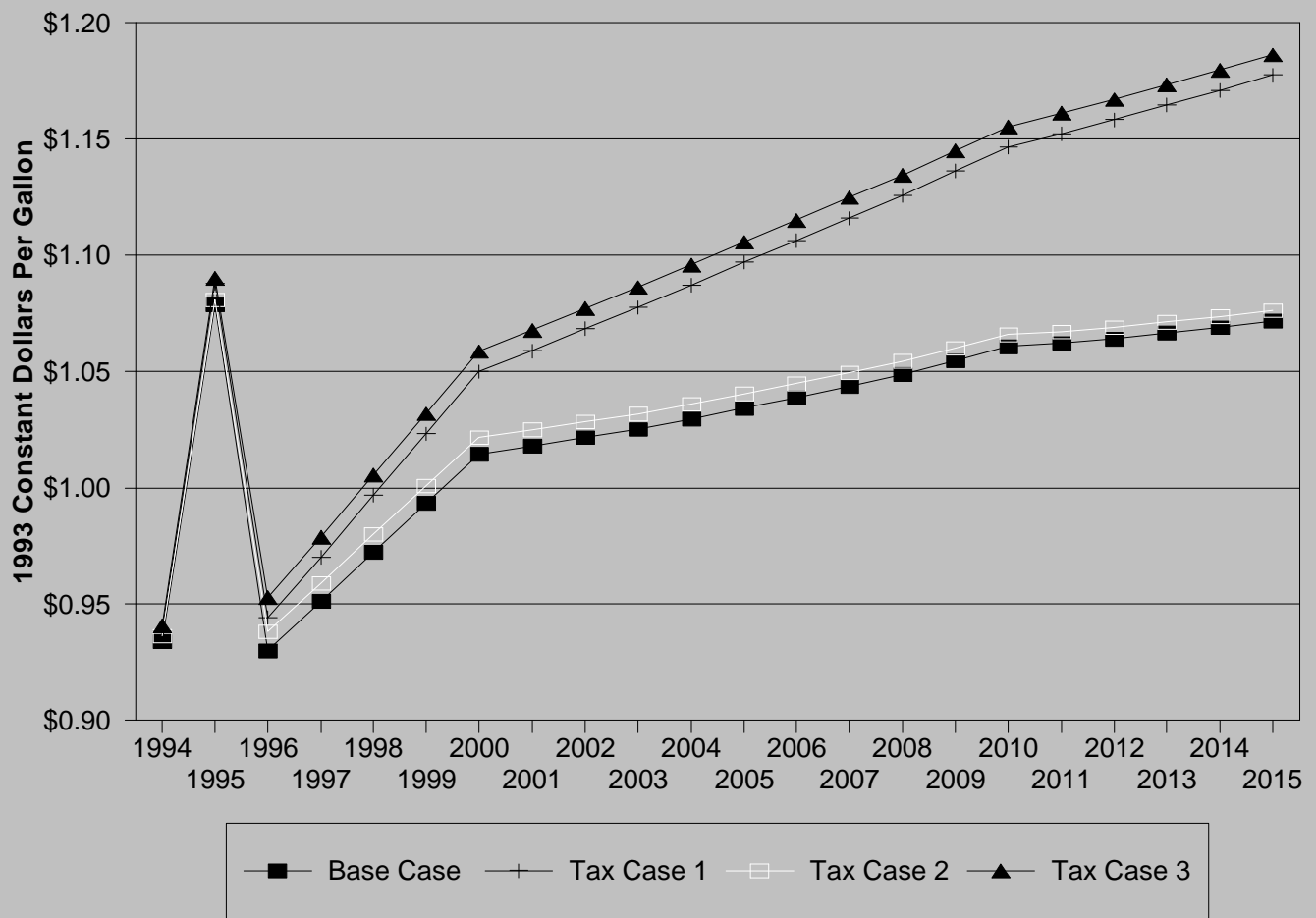
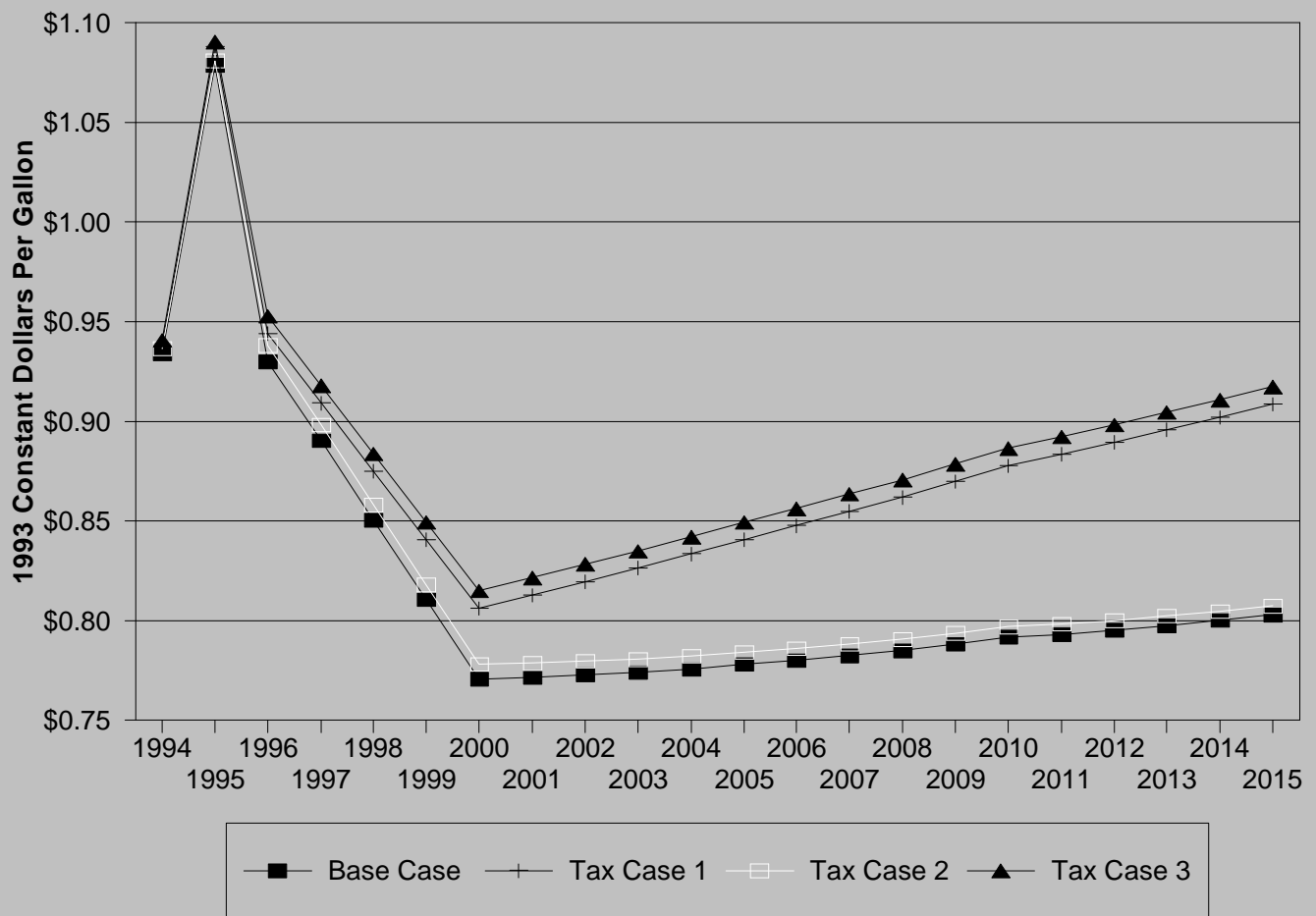


FIGURE 13

CALIFORNIA RETAIL M85, REMOTE METHANOL

Base Case vs. All Tax Case Prices



ADDITIONAL WORK

Electricity Price Forecast

The omission of an analysis of the Base Case electricity forecast is due to the absence of a statewide average forecast to use as a comparison and the need to include a comparison to gasoline's tax burden on a fuel efficiency equivalent basis, rather than on an energy equivalent basis.

Fuel Economy Step

This analysis makes no attempt to set excise taxes equal to gasoline on a fuel efficiency equivalent basis. It should be noted that engines operating on different fuel types do show varying rates of efficiencies. For example, 1.76 gallons of M85 are equivalent to 1.00 gallon of gasoline in terms of energy content. But on the basis of fuel economy, a flexible fuel M85 vehicle may use 1.64 gallons of M85 to travel the same distance that 1.00 gallon of gasoline will transport the vehicle. Performing this additional step will make the analysis of Tax Cases 2 and 3 more accurate.

California Highway Users Tax Fund Revenue Stream Analysis

California's surface transportation system requires ever-increasing amounts of revenue to provide adequate maintenance of the existing infrastructure and to provide the necessary capital for future transportation improvement and mass transit projects. Increasing agency and construction costs, coupled with a slow erosion of revenue streams to the California Highway Users Fund have heightened concerns about the ability of the state to obtain the necessary taxation revenue through traditional means.

Several factors need to be examined to assess how the status quo is shifting and what possible steps could be taken to ensure a reliable stream of taxation revenue for use on the desired level of transportation projects. Future analysis by interested parties should include the effects on taxation revenue streams of:

- Reduced transportation fuel demand due to future price increases
- Reduced fuel demand due to increases in fleet average fuel economy
- Increasing levels of penetration for alternative fueled vehicles
- Changing rates of vehicle miles traveled for the state
- Changing levels of disposable income
- Increasing construction costs for maintenance and improvements
- Diversion of monies from dedicated transportation funds
- Changing scope of transportation projects

SUMMARY

The results of this tax analysis indicate that the Base Case transportation fuel price forecasts could be moderately higher in price if the assumption of fixed excise taxes, throughout the forecast time period, is replaced with the assumption that excise taxes be allowed to increase at the same rate as inflation. Setting the excise taxes equal to gasoline on an energy and taxation basis results in even greater price increases for all the fuels examined, except diesel. **Table 2** summarizes the results and assumed energy contents of the various fuels examined.

This staff working paper should be viewed as a starting point for the discussion of transportation fuel taxation in the context of both fuel price and taxation revenue forecasting. Additional work in this area could provide some valuable input to what type of revenue generation role fuel taxes should play in a future that involves a changing mix of transportation fuel types and project demands to meet the needs of an ever-evolving transportation infrastructure.

Table 2

Summarized Results	Gasoline	Diesel	Propane	Liquified Natural Gas	Compressed Natural Gas	M85
Current Excise Tax Values						
Federal Excise Tax (Cents/Gal)	18.400	24.400	18.300	18.300	4.854	11.400
State Excise Tax (Cents/Gal)	18.000	18.000	6.000	6.000	7.000	9.000
Combined Excise Taxes (Cents/Gal)	36.400	42.400	24.300	24.300	11.854	20.400
Lower Heating Value (Btus/Gal)						
	115,400	128,700	86,650	73,500	100,000	65,675
Revised Excise Tax Values On An Energy Equivalent Basis						
Federal Excise Tax (Cents/100,000 Btus)	15.945	18.959	21.119	24.898	4.854	17.358
State Excise Tax (Cents/100,000 Btus)	15.598	13.986	6.924	8.163	7.000	13.704
Combined Excise Taxes (Cents/100,000 Btus)	31.543	32.945	28.043	33.061	11.854	31.062
Change In Excise Tax Value Required To Equal Gasoline						
Federal Excise Tax (Cents/100,000 Btus)	NA	-3.014	-5.174	-8.953	11.091	-1.413
State Excise Tax (Cents/100,000 Btus)	NA	1.612	8.674	7.435	8.598	1.894
Combined Excise Taxes (Cents/100,000 Btus)	NA	-1.402	3.500	-1.518	19.689	0.481
*Revised Excise Tax Values On A GETE Basis						
Federal Excise Tax (Cents/Gal)	18.400	20.521	13.816	11.719	15.945	10.472
State Excise Tax (Cents/Gal)	18.000	20.075	13.516	11.464	15.598	10.244
Combined Excise Taxes (Cents/Gal)	36.400	40.596	27.332	23.183	31.543	20.716
Change In Excise Tax Value Required To Equal Gasoline						
Federal Excise Tax (Cents/Gal)	NA	-3.879	-4.484	-6.581	11.091	-0.928
State Excise Tax (Cents/Gal)	NA	2.075	7.516	5.464	8.598	1.244
Combined Excise Taxes (Cents/Gal)	NA	-1.804	3.032	-1.117	19.689	0.316

* These Values Are Expressed In Terms Of A Gasoline Energy and Taxation Equivalent Basis.